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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/328,646	06/09/1999	SHI-QING WANG	30-4687(4780	7096

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EXAMINER

VU, HUNG K

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 01/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/328,646

Applicant(s)

WANG ET AL.

Examiner

Hung K. Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2002.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 11, 12, 15, 16, 19, 20 and 23-31 is/are pending in the application.
- 4a) Of the above claim(s) 1-8, 11, 12, 15, 16, 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 29-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Yew et al. (PN 6,265,780).

Yew et al. discloses, as shown in Figure 2E, a dielectric coated substrate which comprises;

a first dielectric composition film (204) on a surface of a substrate (200);

a second dielectric composition film (206) on the first dielectric composition film;

wherein the first dielectric composition and the second dielectric composition have substantially different etch resistance;

wherein either the first dielectric composition film is organic and the second dielectric composition film is inorganic; or the first dielectric composition film is inorganic and the second dielectric composition film is organic; and wherein the inorganic dielectric composition film comprises an inorganic dielectric selected from the group consisting of hydrogensiloxanes, inorganic hydrogensilsesquioxanes and combinations thereof. Note that because two films have different dielectric composition, it is inherent that they have substantially different etch resistance, and wherein hydrogensilsesquioxanes have the formula as claimed.

With regard to claim 30, Yew et al. discloses the first dielectric composition film (204) is organic and the second dielectric composition film (206) is inorganic.

With regard to claim 31, Yew et al. discloses the first dielectric composition film (204) is inorganic and the second dielectric composition film (206) is organic.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 23-25 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Havemann et al. (PN 6,278,174, of record) in view of Zhao (PN 6,071,809, of record). Havemann et al. discloses, as shown in Figures 1e, 2d, and 3c, an integrated circuit structure which comprises a substrate (102) and an organic layer (332) on a surface of the substrate which comprises a pattern of metal lines (112,114,116,118,120) on the substrate and an organic dielectric on the substrate surface between the metal lines; and an inorganic layer (342) on the organic layer which comprises an inorganic dielectric selected from the group consisting of hydrogensiloxanes, inorganic hydrogensilsesquioxanes and combinations thereof, having metal filled vias (160) therethrough which connect to the metal lines of the organic layer, wherein hydrogensilsesquioxanes have the formula as claimed.

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Havemann et al. discloses the organic layer comprises parylene. Havemann et al. does not disclose the organic layer comprises a dielectric selected from the group consisting of polyimides, polyarylethers. However, Zhao discloses an organic layer (310) comprises a dielectric selected from the group consisting of parylene, polyimides, and polyarylethers. Note Figures 3A-6 of Zhao. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the organic layer of Havemann et al. having the dielectric selected from the group consisting of parylene, polyimides, and polyarylethers, such as taught by Zhao because parylene, polyimides, and polyarylethers are commonly used as the dielectric material and they are interchangeable.

With regard to claim 24, Havemann et al. and Zhao disclose the structure comprises,

- an additional organic layer on the inorganic layer which comprises a pattern of additional metal lines on the inorganic layer and an organic dielectric on the inorganic layer between the additional metal lines;

- an additional inorganic layer on the additional organic layer which comprises an inorganic dielectric having metal filled vias therethrough which connect to the additional metal lines of the additional organic layer.

With regard to claim 25, Havemann et al. and Zhao disclose the structure comprises one or more further alternating organic layers (c) and inorganic layers (d) on the additional organic layer (c) and inorganic layer (d).

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With regard to claim 28, Havemann et al. and Zhao disclose the metal lines and vias have a barrier metal on one or more edges thereof.

With regard to claim 29, Havemann et al. and Zhao disclose a dielectric coated substrate which comprises;

a first dielectric composition film (332) on a surface of a substrate (102,402);

a second dielectric composition film (342) on the first dielectric composition film;

wherein the first dielectric composition and the second dielectric composition have substantially different etch resistance;

wherein either the first dielectric composition film is organic and the second dielectric composition film is inorganic; or the first dielectric composition film is inorganic and the second dielectric composition film is organic; and wherein the inorganic dielectric composition film comprises an inorganic dielectric selected from the group consisting of hydrogensiloxanes, inorganic hydrogensilsesquioxanes and combinations thereof. Note that because two films have different dielectric composition, it is inherent that they have substantially different etch resistance, and wherein hydrogensilsesquioxanes have the formula as claimed.

With regard to claim 30, Havemann et al. and Zhao disclose the first dielectric composition film (332) is organic and the second dielectric composition film (342) is inorganic.

3. Claims 23-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao (PN 6,071,809, of record) in view of Yew et al. (PN 6,265,780).

Zhao discloses, as shown in Figures 3A – 6, an integrated circuit structure which comprises a substrate (302) and an organic layer (316, upper portion of 602) on a surface of the substrate which comprises a pattern of metal lines on the substrate and an organic dielectric on the substrate surface between the metal lines; and an inorganic layer (lower portion of 604 that is equivalent to 310) on the organic layer which comprises an inorganic dielectric selected from the group consisting of silsesquioxanes, having metal filled vias therethrough which connect to the metal lines of the organic layer.

Zhao does not disclose silsesquioxane is hydrogensilsesquioxanes having a formula as claimed. However, Yew et al. discloses an inorganic layer (206) comprises hydrogensilsesquioxanes having a formula as claimed. Note Figure 2E of Yew et al. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the silsesquioxane of Zhao comprising hydrogensilsesquioxanes having a formula as claimed, such as taught by Yew et al. because hydrogensilsesquioxanes have lower dielectric constant and are commonly used as interlevel dielectric layer.

With regard to claim 24, Zhao and Yew et al. disclose the structure comprises,

an additional organic layer on the inorganic layer which comprises a pattern of additional metal lines on the inorganic layer and an organic dielectric on the inorganic layer between the additional metal lines;

an additional inorganic layer on the additional organic layer which comprises an inorganic dielectric having metal filled vias therethrough which connect to the additional metal lines of the additional organic layer.

With regard to claim 25, Zhao and Yew et al. disclose the structure comprises on or more further alternating organic layers (c) and inorganic layers (d) on the additional organic layer (c) and inorganic layer (d).

With regard to claim 26, Zhao and Yew et al. disclose the structure further comprising an organic dielectric layer on the inorganic layer between the vias and under the additional metal lines of the additional organic layer; and an inorganic dielectric on the organic dielectric layer between the additional metal lines of the additional organic layer.

With regard to claim 27, Zhao and Yew et al. disclose the structure further comprising an organic dielectric layer on each one or more alternating inorganic layer (d) between the vias and under the additional metal lines of the alternating organic layer; and an inorganic dielectric on each one or more organic dielectric layer between the additional metal lines of the additional organic layer.

With regard to claim 28, Zhao and Yew et al. disclose the metal lines and vias have a barrier metal on one or more edges thereof.

With regard to claim 29, Zhao discloses a dielectric coated substrate which comprises;
a first dielectric composition film (316 or 310) on a surface of a substrate (302);

a second dielectric composition film (lower portion of 604 or 316) on the first dielectric composition film;

wherein the first dielectric composition and the second dielectric composition have substantially different etch resistance;

wherein either the first dielectric composition film is organic and the second dielectric composition film is inorganic; or the first dielectric composition film is inorganic and the second dielectric composition film is organic; and wherein the inorganic dielectric composition film comprises an inorganic dielectric selected from the group consisting of silsesquioxane. Note that because two films have different dielectric composition, it is inherent that they have substantially different etch resistance.

Zhao does not disclose silsesquioxane is hydrogensilsesquioxanes having a formula as claimed.

However, Yew et al. discloses an inorganic layer (206) comprises hydrogensilsesquioxanes having a formula as claimed. Note Figure 2E of Yew et al. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the silsesquioxane of Zhao comprising hydrogensilsesquioxanes having a formula as claimed, such as taught by Yew et al. because hydrogensilsesquioxanes have lower dielectric constant and are commonly used as interlevel dielectric layer.

With regard to claim 30, Zhao and Yew et al. disclose the first dielectric composition film (316) is organic and the second dielectric composition film (lower portion of 604) is inorganic.

With regard to claim 31, Zhao and Yew et al. disclose the first dielectric composition film (310) is inorganic and the second dielectric composition film (316) is organic.

Response to Arguments

4. The rejections under Rose (PN 6,207,555) are accordingly withdrawn.

5. Applicant's arguments filed 11/14/02 have been fully considered but they are not persuasive.

It is argued, at pages 9-10 of the Remarks, that Zhao does not disclose the structure having either the first dielectric composition film is organic and the second dielectric composition film is inorganic, or the first dielectric composition film is inorganic and the second dielectric composition film is organic. This argument is not convincing because Zhao discloses, as shown in Figures 3A-6, an organic layer (316) and an inorganic layer (310) on the organic layer, or an inorganic layer (lower portion of 604) and an organic layer (316) on the organic layer

6. Applicant's arguments with respect to claims 23 and 29 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

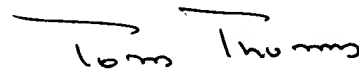
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 7:00-4:30 and every other Friday 7:00-3:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

January 22, 2003


TOM THOMAS
SUPERVISOR
TECHNICAL SERVICES